



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

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ENVIRONMENTAL RESPONSE DIVISION

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INFORMATION BULLETIN

KINGSFORD/BREITUNG TWP. SITE KINGSFORD, DICKINSON COUNTY

February 2000

INTRODUCTION

This is the second information bulletin from the Michigan Department of Environmental Quality (DEQ) on continuing environmental investigations regarding the presence of methane gas, groundwater, soil and surface water contamination at the Kingsford/Breitung Township site of environmental contamination (see Figure 1 for Area of Concern). Since our first public meeting with you in September 1997 and our January 1999 information bulletin, there have been two public meetings (February and October 1999) sponsored by Ford Motor Company (FORD) and Kingsford Products Co. (KPC), in addition to several progress updates prepared by the companies and mailed to local citizens.

Many of you have approached the DEQ with questions about information received from FORD and KPC. This bulletin should help address those questions and provide an overview of the many site activities that have taken place this past year (see Chronology of Events).

DEQ staff is available to help clarify issues or address concerns you may have on any aspect of ongoing site investigations. Please feel free to call on the MDEQ Project Manager for this site at any time (see For More Information).

PUBLIC INFORMATION MEETING

The DEQ has scheduled a public information meeting for 6:30 p.m. on **Wednesday, March 8, 2000**, at the Kingsford High School Auditorium, 431 Hamilton Avenue, Kingsford. The purpose of this meeting is to answer any additional questions you may have concerning this site and to provide an update on site activities.

SITE HISTORY

From 1921 through 1951, FORD operated a plant in Kingsford that produced wooden automobile body parts. The plant generated approximately 400 tons of scrap wood daily. To utilize the scrap wood, a wood carbonization and distillation plant was put into operation in 1924. The wood carbonization plant produced charcoal and briquettes, while the distillation plant produced several commercial chemical products, including methanol, acetates, acetone, alcohols, creosote, pitch, ketones, and heavy and light oils. When FORD ceased its wooden automotive parts operations in 1951, the plant was sold to KPC's predecessor, Kingsford Chemical. Kingsford Chemical continued operation of the wood carbonization/ distillation plant until its closure in 1961.

Waste products generated by FORD/KPC plant operations were disposed of in at least three known areas: the Riverside Dump, the Tar Pits, and the more recently identified Charcoal Dump (see Figure 1). The waste products included: off-spec chemicals, noncommercial tar/creosote, noncombustible products, washdown water, wastewater, cooling water, and residual waste chemicals produced from plant shutdown and cleaning operations. *[Methane present in the groundwater and soil at this site is a byproduct of the decomposition of many of these waste products.]*

In July 1995, an explosion at a Kingsford residence (later attributed to accumulations of methane gas venting into the basement of the home) prompted an intensive investigative effort of this area by several agencies. The U.S. Environmental Protection Agency (EPA) and the U.S. Geological Survey addressed the source and extent of the methane gas problem. Subsequently, the DEQ and Arcadis, Geraghty & Miller -- a consulting firm for FORD and KPC, investigated the source and extent of soil, groundwater and surface water impact and the related methane gas problem. Highlights follow:

SITE GEOLOGY

The investigation area at this site is comprised of a complex, varied and layered system of four loose, uncompacted soil types overlying a massive bedrock layer. In general, the soil types (ranging from the shallowest to the deepest) include: 1) historic river/stream sediment sands located adjacent to the Menominee River; 2) intermixed layers of fine to coarse glacial runoff sands and gravels; 3) successive layers, in no particular order, of lacustrine (lake) silts, clays and very fine sands; and 4) a basal till – unsorted sediments from glacial runoff.

The groundwater flow is predominantly confined to the overlying sand and gravel deposits. The multiple sand and gravel layers form a complex system of semi-confined and leaky confined aquifers, separated by the finer grained silt and clay deposits. Groundwater flow in these glacial deposits occurs in westerly, southwesterly and southerly directions towards the Menominee River.

GROUNDWATER

Findings: Since 1996, approximately 100 groundwater monitoring wells have been installed to help delineate the extent of groundwater contamination at the Kingsford/Breitung Twp. site. Water samples collected and analyzed from these wells reveal the greatest concentration of contamination is located in and around the vicinity of the former FORD/KPC plant (see Figure 2). The wastes disposed of in the Tar Pits area are the primary source of this contamination. The general trend of the contamination plume appears to agree with the direction of groundwater flow, towards the Menominee River.

In some cases, water samples were collected at different depths from the same monitoring location (e.g. GM-25A, GM-25B, and GM-25C). In those cases, the greatest concentration of hazardous substances identified was used to develop Figure 2. Typically, the greatest concentrations of hazardous substances are present in the deeper parts of the aquifer (e.g. greater than 100 feet below ground surface).

To date, 30 known hazardous substances have been identified in the groundwater that exceed the Michigan Natural Resources and Environmental Protection Act (NREPA/Public Act 451 of 1994) Part 201 Residential Drinking Water Criteria (see Glossary). These hazardous substances include: acetaldehyde, acetone, acetic acid, aluminum, arsenic, barium, n-butanol,

benzene, bis(2-ethylhexyl)phthalate, chromium, cis-1,2-dichloroethene, copper, diethylether, 2,4-dimethylphenol, ethylene glycol, iron, isopropanol, lead, manganese, methanol, methylene chloride, 2-methylphenol, 3-methylphenol, 4-methylphenol, phenol,

tetrachloroethene, trichloroethene, tetrahydrofuran, sulfate, and vanadium.

Actions: Currently, FORD and KPC are finalizing a groundwater remedial investigation report and expect to submit their findings to the DEQ by spring 2000. Following that, the companies will begin to evaluate site cleanup options. As part of the comprehensive cleanup actions necessary for the site, FORD and KPC are presently working with the City of Kingsford on an ordinance to restrict installation and use of any groundwater supply wells in the Area of Concern.

Public Safety: Please keep in mind, the public water supply wells that service nearly all of the residents and businesses in the City of Kingsford/Breitung Township area are located outside of the Area of Concern, near the Ford Airport. The City of Kingsford tests its public supply wells on a regular basis and these wells meet federal and state drinking water standards.

GROUNDWATER IMPACTS ON SURFACE WATER

Findings: Thirteen monitoring wells were installed along the east side of the Menominee River in June 1998. The monitoring wells were installed to evaluate the quality of groundwater entering the Menominee River. Analytical data of samples collected from these wells indicate hazardous substance concentrations in six of the 13 monitor wells (GM-5, GM-25A, GM-25B, GM-26A, GM-26C, and GM-27A) exceed the Part 201 Groundwater/Surface Water Interface (GSI) Criteria (see Glossary). The substances include acetone, acetic acid, barium, 2,4-dimethylphenol, formaldehyde, 2-methylphenol, 4-methylphenol, phenol, and vanadium. In addition, a continuous discharge of methane gas can be seen bubbling up on the surface of the east bank of the Menominee River approximately 700 feet southwest of the Riverside Dump (see Figure 2). Gas can also be seen bubbling up in other locations on the river.

Actions: Due to the presence of multiple hazardous substances in some of the monitoring wells along the river, the DEQ determined that additional toxicity testing was necessary to assess the effect the contaminated groundwater has on aquatic life. From July 1999 to November 1999, groundwater samples were collected from the six contaminated monitoring wells along the River. This sampling, and testing of two groups of aquatic organisms (insect-water flea and fish- flathead minnow) for short term (acute) exposure indicated that the contaminated groundwater in at least two of the monitoring wells (GM-25B and GM-26A) is acutely toxic to aquatic life. The release of acutely toxic

groundwater to the surface waters is prohibited by NREPA and Part 31 (Water Resources Protection) Rules. Additional toxicity testing is being performed on other wells to help identify appropriate remedial measures needed to prevent further discharge of acutely toxic groundwater to the Menominee River. At the time of this bulletin printing this subsequent toxicity data was not yet available.

Public Safety: While the exceedences of water quality criteria pose a risk to aquatic life, the expected level of contaminants reaching the Menominee River does not appear to pose a concern for human exposure (e.g. swimming, wading, or fish consumption).

SOIL

Investigations to date reveal that waste products were disposed of in at least three areas – the Riverside Dump, the Tar Pits and the Charcoal Dump (see Figure 1). These areas were unlined and lacked measures to contain the wastes or contaminants that could leach from the wastes. We also have information to believe disposal may have occurred at an area identified in Figure 1 as the Breen Street Dump. These disposal areas are further defined below:

Riverside Dump

The Riverside Dump, an abandoned, unlicensed industrial waste dump, is located in a relatively undeveloped area on the south side of West Pyle Drive, across from Woodland Elementary School. The area is vegetated by grasses and shrubs with only a few exposed waste areas. The terrain is relatively uneven due to considerable amounts of debris near the surface.

Findings: In August 1999, 13 soil samples were collected to further characterize the near-surface waste materials within the disposal area. The waste materials consist mostly of charred wood, charcoal, and construction debris (e.g. bricks). Analytical data collected in August 1999 and during earlier investigations indicate that the waste materials are contaminated by a variety of hazardous substances including: aluminum, arsenic, barium, cadmium, cobalt, iron, lead, manganese, mercury, molybdenum, tetrachloroethene, 1,1,2,2-tetrachloroethene, silver, and xylene. Concentrations of these hazardous substances exceed the Part 201 Soil Criteria Protective of Residential Drinking Water. In addition, levels of arsenic, lead and 1,1,2,2-tetrachloroethene in some of the waste materials were found to exceed the Part 201 Residential Direct Contact Criteria (see Glossary).

Actions: Last spring, FORD and KPC, in cooperation with the City of Kingsford, enclosed the Riverside

Dump with plastic fencing as an interim measure to minimize the potential for direct contact with these soils. FORD and KPC are currently working with the City of Kingsford to develop a final remedy for the area. The companies expect to present a proposal to the DEQ by spring 2000, with implementation of the remedy anticipated by summer 2000.

Public Safety: Walking across or playing in the area should be avoided until an acceptable remedy is in place that assures the area will not pose a risk to the public health.

Tar Pits

The Tar Pits, located immediately west of the plant, consist of interconnected depressions (see Figure 2). The surface area of the Tar Pits exceeds 120,000 square feet and varies in depth, up to 34 feet. For the purpose of this bulletin, we refer to these depressions as: 1) The Southwest Pit (Lodal Park) and 2) The Northeast Pit (Balsam Street). In August 1999 and October 1999, soil samples were collected from the tar pits to determine if contaminants were present in the surface soil and to further characterize the waste materials found in the pits during earlier soil sampling. Highlights follow:

1) Southwest Pit (Lodal Park)

The southwest portion of the Tar Pits is located at the north end of Lodal Park. The northern softball and football fields are constructed directly over the Southwest Pit. This area is relatively well vegetated except for the infield area of the softball field, which is sand covered.

Findings: Soil borings conducted in October of 1999, along with data from past investigations, reveal a 2.5 to five foot thick sand cap present over the Southwest Pit. The findings further indicate that the **sand cap** is not contaminated with hazardous substances above any of the Part 201 Residential Cleanup Criteria. In addition, waste materials found beneath the sand cap in the Southwest Pit consist mostly of wood fragments, charred wood, and charcoal. Analytical data to date indicate that these buried **waste materials** are contaminated with 3-methylphenol/4-methylphenol at concentrations that exceed the Part 201 Residential Drinking Water Criteria, but do not exceed the Part 201 Residential Direct Contact Criteria.

Actions: Since these waste materials are not present at the surface, actions to date have been limited to investigations.

Public Safety: Currently, walking across or playing in this area should not be a concern because of the sand

cap, however, the cap should not be disturbed by digging.

2) Northeast Pit (Balsam Street)

The northeast portion of the Tar Pits is located in the vacant lot on the west side of Balsam Street between Dickinson Homes and the Kingsford Department of Public Works Building. The majority of this area is covered with sand and gravel. Small amounts of tar seep to the ground surface at several points in this area.

Findings: Analytical data collected from borings drilled this past fall and during past investigations indicate the Northeast Pit is the most heavily contaminated portion of the Tar Pits. Waste materials found in the Northeast Pit consist mostly of wood fragments, charred wood, charcoal, tar and sludge. Two hazardous substances -- 1,2,4-trimethylbenzene and xylene -- were identified in the waste that exceed the Part 201 Industrial Direct Contact Criteria (see Glossary).

Actions: Since 1998, FORD and KPC have removed approximately 65 tons of a sand/tar mixture from the ground surface in this area. The companies will continue to remove tar that comes to the surface.

Public Safety: Walking across or playing in this area should be avoided until a remedy is in place that assures the area will not pose a risk to public health or the environment.

Charcoal Dump

The charcoal dump, which came to our attention in summer 1999, is located in a relatively undeveloped area on the northwest side of the intersection of Power Dam Road and Woodward Avenue, near Cowboy Lake. The area is well vegetated with grasses and trees, with only a few exposed waste areas. The terrain is relatively uneven due to debris near the surface.

Findings: In September 1999, eight soil samples were collected by the DEQ to characterize the near-surface waste materials at the Charcoal Dump disposal area. Waste materials found consist mostly of charred wood, charcoal, and construction debris (e.g. bricks and concrete). Laboratory data indicate that the waste materials from this area are contaminated with the hazardous substances benzene, lead and manganese.

Actions: Based on these results, the DEQ has asked FORD and KPC to conduct additional investigations to characterize the wastes and the potential for impact on groundwater in this area.

Public Safety: Until this area is more adequately characterized, walking across, playing at or disturbing

(e.g. digging) the area should be avoided until a remedy for the area is approved and in place.

Breen Street Dump

This waste disposal area is located at the west end of Breen Street in Kingsford. FORD owned this area from the 1920s until 1951; Kingsford Chemical (later KPC) owned the area after 1951, retaining portions of the area until 1972. Additional investigations will be needed in this area to determine what (if any), potential hazards may be associated with this dump.

METHANE GAS

Findings: Data collected this past summer/fall and during past investigations reveal that the methane gas present in the groundwater and soil within the Area of Concern is a by-product of the decomposition of the organic contaminants present in the groundwater. Within portions of the area of concern (see Figure 1), methane gas has migrated upwards into the subsurface soils above the water table through openings in the silt and clay layers. Where these "pockets" (accumulations) of methane gas have been identified, FORD and KPC have been implementing tests to control the migration of the methane and to understand its fate and transport.

Actions: Since May 1998 FORD and KPC have been venting and monitoring the methane gas pockets within the Area of Concern. Two soil venting technologies are being used to control methane accumulation and to allow further investigations into the migration, fate and transport of the methane gas. Their program consists of using both active (soil vapor extraction (SVE)) and passive (vents) systems. Information gained from the venting program is being evaluated, and will be used to devise a remedy for controlling methane gas throughout the Area of Concern.

SVE is an innovative on-site treatment process that involves inducing airflow in the subsurface with an applied vacuum. A SVE system uses vapor extraction wells with blowers or vacuum pumps to remove vapors from zones permeable to air flow. Passive systems involve a process that allows the methane trapped in the subsurface soils to vent "naturally" to the atmosphere. Figure 1 displays the location of the active and passive venting systems.

SVE systems have been installed in three areas: Breen/Garfield Avenue, Emmet/Grant Avenue, and the Riverside Dump. Two of the systems, Breen/Garfield and Emmet/Grant, are in operation; the newer third system at the Riverside Dump should be in operation as soon as FORD and KPC obtain DEQ Air Quality Division permits. Passive vents have been installed in eight locations within the Area of Concern. The passive systems are located in residential areas and vent methane

gas to the atmosphere approximately 20 feet above the ground surface via flagpoles. Some of the passive vents are operated intermittently to assure compliance with air emission requirements.

Public Safety: Since September 1997, more than 1,500 methane detectors have been distributed to area residents by the DEQ and the City of Kingsford. Of 253 detector alarms reported to date, only two were related to methane and, upon further investigation, no methane safety hazard was found. Methane detectors continue to be made available to residents within the Area of Concern at no charge and may be obtained from the Kingsford Public Safety Department, 510 S. Westwood Ave., Kingsford.

The DEQ and EPA advise residents in the defined Area of Concern to inspect their basements and foundations for cracks and openings through which methane gas could enter, and to make any necessary repairs. An EPA guide that addresses such repairs accompanies each methane detector distributed.

In January 2000, FORD and KPC in cooperation with Kingsford/Breitung Township Public Safety, began implementation of a methane detector enhancement program for the residents living within the Area of Concern. If a resident chooses to participate, Arcadis, Geraghty and Miller (Arcadis) will, at no charge to residents, conduct a methane survey of the home and discuss the proper use and maintenance of the detectors, in an effort to reduce the potential for non-methane related alarm soundings. If you would like further information regarding the methane detector enhancement program contact Arcadis at (906) 776-0206.

investigation at the Kingsford Hydroelectric Plant that involved construction and sampling of five monitoring wells. Laboratory data regarding groundwater quality at this location was unavailable at the time of this bulletin printing. It is not known at this time if the methane at the Kingsford Hydroelectric powerhouse is related to the FORD/KPC plant.

UPCOMING ACTIVITIES

In addition to the DEQ's March 8, 2000 public information meeting, FORD and KPC plan to submit a (groundwater) Remedial Investigation report to the DEQ by spring 2000. The report will summarize all data collected to date. This report had originally been expected in fall 1999, but was delayed due to additional investigative work required pertaining to the Menominee River. This report will form the basis for subsequent decisions for remedial actions that will need to be implemented.

FOR MORE INFORMATION

This bulletin is being provided to residents within the Area of Concern, and is available from the DEQ to any interested persons, upon request. For more comprehensive information on the project and activities, you may either visit the Information Repository located at the Dickinson County Library, 401 Iron Mountain Street, Iron Mountain, or contact the DEQ project coordinator:

Christopher Austin
DEQ Environmental Response Division
Crystal Falls Field Office
1420 U.S. 2 West
Crystal Falls, MI. 49920
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If you did not receive this bulletin in the mail, and would like to receive further information regarding the site, please contact Mr. Austin to have your name added to the DEQ mailing list.

KINGSFORD HYDROELECTRIC DAM REMEDIAL INVESTIGATION

In 1997, methane gas was discovered discharging from a small diameter well installed at the Kingsford Hydroelectric powerhouse. To ensure the safety of the plant and its employees, preventive measures (installation of methane detectors and keeping windows opened) were implemented by Wisconsin Electric to reduce the risk of methane accumulation and explosion. In September 1999, the DEQ conducted a remedial

CHRONOLOGY OF EVENTS

July 1995 – Accumulation of methane gas in a basement led to the explosion of a residential dwelling at 2104 Breen Ave. Response actions by the Michigan Consolidated Gas Company confirmed the presence of methane gas at explosive levels, but eliminated the natural gas pipeline in the area as the source.

December 1995 – U.S. Senator Carl Levin requested that the U.S. Environmental Protection Agency (EPA) become involved in efforts to control methane gas in the residential area along the intersection of Breen and Garfield Avenues.

January 1996 to February 1996 – The EPA and its subcontractors designed/installed a soil vapor extraction (SVE) system to control methane gas in the Breen/Garfield Ave. area.

March 1996 – The EPA organized government and university groups to determine the source, nature, and extent of the methane gas problem in Kingsford.

April 1996 to September 1996 – The EPA and its subcontractors began an investigation into the source of the methane gas problem. The work included the installation of monitoring wells and temporary soil gas probes, geophysical logging, and sampling of soil and groundwater. The investigation identified areas where high concentrations of methane were present in groundwater, which resulted from the biological decomposition of organic contaminants. The EPA determined that potential sources of the methane included areas used for disposal of wood-waste byproducts from past charcoal and chemical manufacturing practices.

May 1996 – The Michigan Department of Environmental Quality (DEQ) agreed to take over operation and maintenance (O&M) of the SVE system in the Breen/Garfield Ave. area.

March 1997 – Accumulations of methane gas in and around the residential dwelling at 2001 Emmet Ave. prompted the EPA and its subcontractors to design and install a SVE system in the Emmet/Grant Ave. area.

May 1997 – FORD and KPC entered an Administrative Order by Consent (AOC) with the EPA to perform an Engineering Evaluation and Cost Analysis Study (EE/CA). The purpose of the study was to characterize the soil and groundwater conditions, determine the transport and fate of methane gas in the subsurface, and to evaluate possible remedial alternatives.

May 1997 to March 1998 – Arcadis, Geraghty & Miller (ARCADIS), FORD and KPC's consultant, performed the EE/CA work. The work included the installation of monitoring wells, soil borings, and soil gas probes; the measurement of groundwater levels; and soil and groundwater sampling. Results of this investigation show that soil and groundwater conditions at the site are extremely complex, that methane gas is present in the groundwater in an area larger than originally estimated, and that the methane gas is associated with elevated levels of organic contaminants in the soil and groundwater.

June 1997 – The DEQ notified FORD of its legal responsibilities under Part 201 (Environmental Remediation) of the Natural Resources and Environmental Protection Act, 1994 Public Act 451, as amended, and requested that FORD voluntarily take the necessary actions to resolve its liability regarding the former Ford Motor Company Plant site in Kingsford.

July 1997 – The DEQ agreed to take over operation and maintenance of the SVE system in the Emmet/Grant Ave. area.

September 1997 – The DEQ, in cooperation with the City of Kingsford, provided free methane detectors and related guidance to residents living within the City of Kingsford and Breitung Township. The methane detectors continue to be provided free of charge, as a precautionary measure for area residents.

January 1998 – The DEQ notified KPC of its legal responsibilities under Part 201, and requested that KPC voluntarily undertake the necessary actions to resolve its liability regarding the former Ford Motor Company Plant site in Kingsford.

May 1998 – In response to DEQ's June 1997 and January 1998 requests, FORD and KPC submitted a draft remedial investigation (RI) work plan. The work plan was revised in July 1998 to include comments from the DEQ. The objectives of the RI are to: characterize soil and groundwater conditions, define the nature and extent of soil and groundwater contamination, evaluate groundwater contamination discharging into the Menominee River, and to further evaluate the presence, concentration, and origin of methane gas in the subsurface soils.

June 1998 – The EPA transferred all regulatory aspects of the site to the DEQ. The DEQ began oversight of the additional work being performed by ARCADIS.

June 1998 to present – ARCADIS has carried out the RI. The work includes the installation of monitoring wells and gas probes, drilling soil borings, measurement of groundwater levels, monitoring of gas probes, test pitting, and sampling of soil and groundwater.

June 1998 to September 1998 – FORD and KPC voluntarily implemented interim response (IR) activities at the site. The work included weekly surficial tar removal at the Tar Pits, monitoring of the two SVE systems located at 2104/2108 West Breen Ave. and 2001 Emmet Ave., and upgrades to the SVE systems.

July 1998 – FORD and KPC submitted the EE/CA report to EPA. The report recommended conducting additional work due to the complex nature of the soil and groundwater conditions.

September 1998 – FORD and KPC signed an agreement with the DEQ to continue their IR activities, and to implement an emergency response plan (ERP). The purpose of the ERP is to define actions to be taken to ensure the safety of the communities should a methane gas emergency arise.

CHRONOLOGY OF EVENTS

February 1999 – FORD and KPC hosted their first public meeting at Kingsford High School to provide an update to area residents of the on-going work in the study area.

March 1999 – FORD and KPC submitted a report to the Wisconsin Department of Natural Resources that summarized data collected by the companies in Wisconsin.

March 1999 – FORD and KPC submitted a work plan for a passive venting pilot test to the DEQ. The objectives of the pilot test are to: reduce the build up of methane gas, determine if the methane gas is present as only long-term accumulations or if it is quickly replenished by a continuing source, and to characterize gas emissions from the venting probes.

June 1999 – The house at 2104 West Breen Avenue was dismantled.

July 1999 – FORD and KPC submitted an information package to the DEQ to support re-calculation of a Final Acute Value (FAV) and a Final Chronic Value (FCV) for 2,4-dimethylphenol.

July 1999 – FORD and KPC submitted a sampling work plan for the Riverside Dump and Tar Pits to the DEQ. The objective of sampling plan was to further characterize the near surface waste materials and soils.

August 1999 – FORD and KPC hosted a public information session at Kingsford City Hall to answer residents' questions regarding the ongoing investigation.

October 1999 – FORD and KPC hosted their second public meeting at Kingsford High School to provide an update to area residents regarding on-going investigations in the study area.

October 1999 – FORD and KPC submitted a scope of work for toxicity identification evaluation and an evaluation of the Menominee River to the DEQ. The objectives of the scope of work are to: evaluate the causes of toxicity to organisms exposed directly to the groundwater sample from Monitoring Well GM-25B, and to evaluate chemical concentrations.

GLOSSARY

Aquifer: A water-saturated underground formation or geologic unit composed of materials such as sand, soil, gravel or rock that can store and supply groundwater in significant quantities.

Groundwater: Underground water that fills pores in soils or openings in rocks to the point of saturation. In aquifers, groundwater occurs in sufficient quantities for use as drinking and irrigation water and other purposes.

Groundwater Surface Water Interface (GSI) Criteria: Identifies a groundwater concentration that is protective of a receiving surface water, in situations where groundwater is discharging to surface water bodies.

Industrial Direct Contact Criteria: Identifies a soil concentration which is protective against adverse health effects due to long-term ingestion of and dermal (skin) exposure to contaminated soil for industrial land uses.

Natural Resources and Environmental Protection Act (NREPA), PA 451 of 1994, as amended: An act to protect the environment and natural resources of the state. On January 18, 1994, all laws relating to the environment and natural resources of the state were revised, consolidated and arranged as "Parts" under and by the authority of this one single law.

Part 31: Part 31 (Water Resources Protection) provides for the protection of the waters of Michigan by controlling the discharge of wastes and wastewater to the ground, groundwater and surface waters of the state.

Part 201: Part 201 (Environmental Remediation) of NREPA and its administrative rules provide for the identification, risk assessment, evaluation and cleanup of sites of environmental contamination in the state.

Residential Drinking Water Criteria: Identifies a drinking water concentration that is safe for long-term, daily residential consumption. Adverse aesthetic impacts are taken into account for select hazardous substances.

Residential Direct Contact Criteria: Identifies a soil concentration that is protective against adverse health effects due to long-term ingestion of and dermal (skin) exposure to contaminated soil for residential land uses.

Soil Criteria Protective of Residential Drinking Water: Identifies a soil concentration that is not expected to leach and contaminate groundwater at levels greater than residential drinking water criteria.